



NSCAS-Science Update

Jeremy Heneger

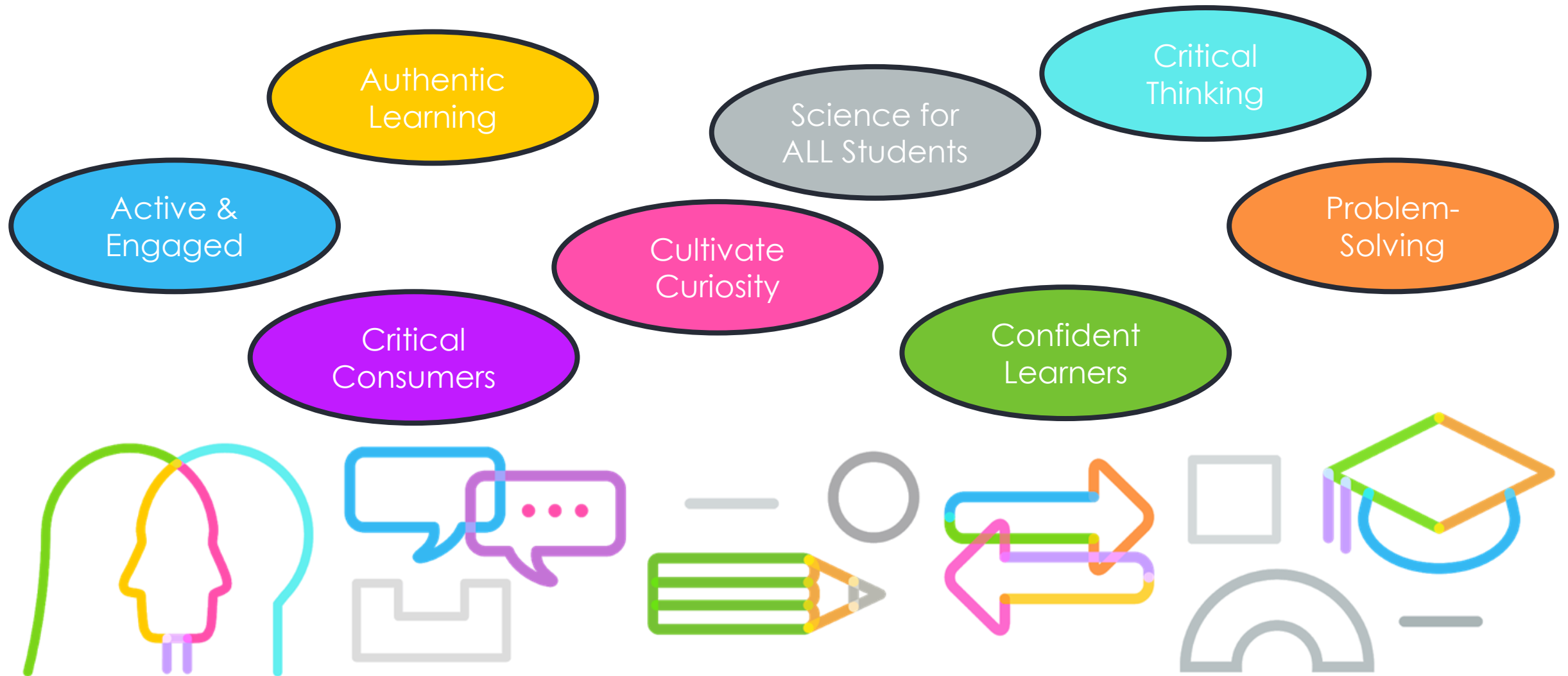
Director of Statewide Assessment

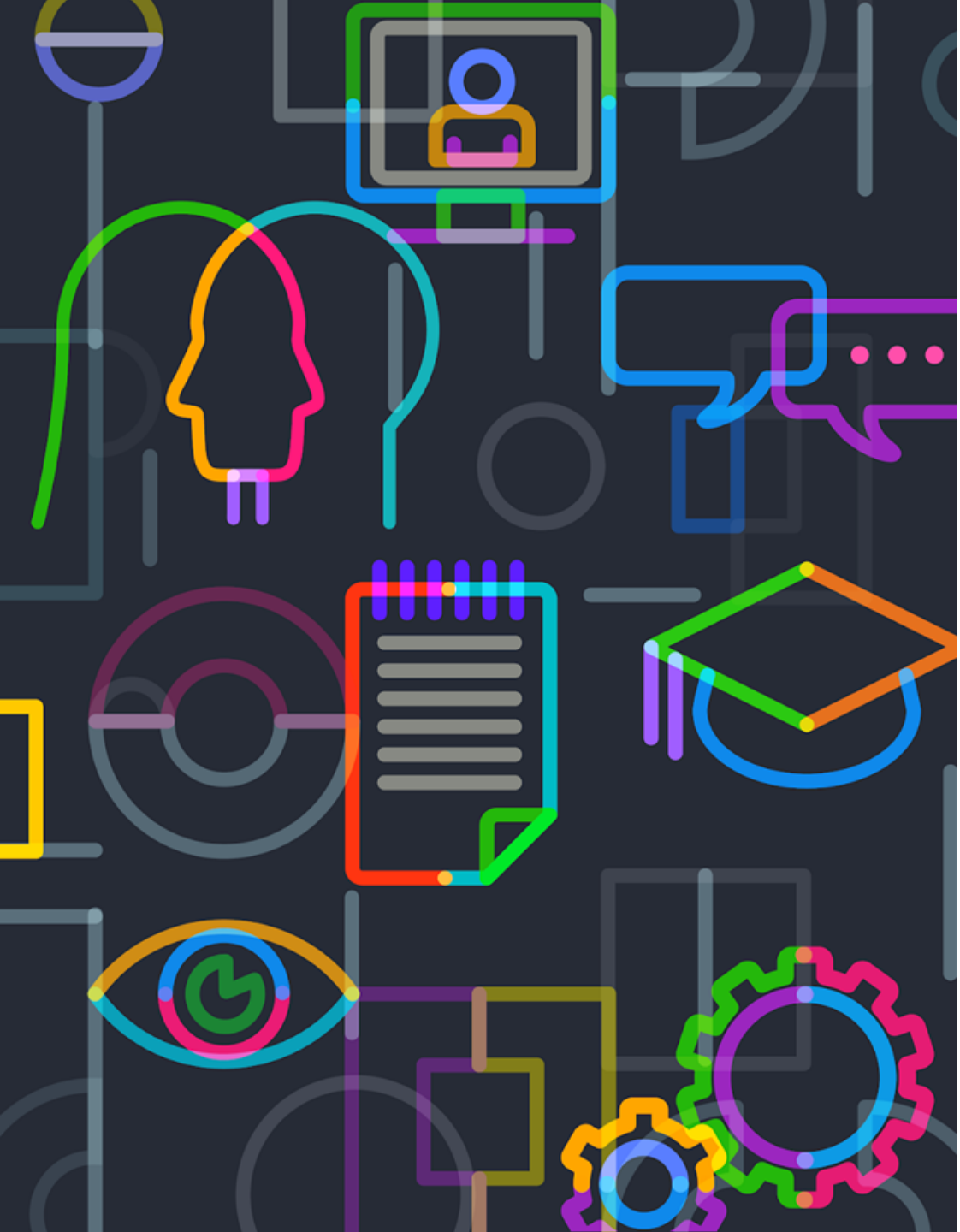


Nebraska's Vision for Science Education

What, Why, & How

What is Nebraska's Vision for Science Education?





“...by the end of 12th grade, ***all students*** have some appreciation of the beauty and wonder of science; ***possess sufficient knowledge*** of science and engineering to ***engage in public discussions*** on related issues; are ***careful consumers*** of scientific and technological information related to their everyday lives; are able to ***continue to learn*** about science outside school; and have the ***skills to enter careers of their choice***, including (but not limited to) careers in science, engineering, and technology.”

~A Framework for K-12 Science Education (NRC, 2012
p. 16)

Why is this Nebraska's Vision for Students?

Achieve Scientific Literacy

Equity

Application of Knowledge

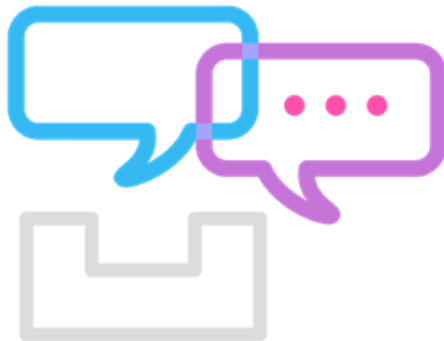
Everything is Connected

Prepared for Future Challenges

Transferable Skills

World Citizens

Prepared for STEM Careers



Why It's Time for **NEW** SCIENCE EDUCATION STANDARDS

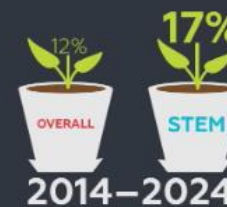


Science education needs to keep pace with the changing world around us¹



We've made major advances in science and technology

Our nation's workforce needs people with STEM skills²



STEM employment is expected to grow faster than overall employment



STEM jobs comprise 20% of all U.S. jobs



STEM majors earn \$300K MORE than non-STEM majors over their lifetime

Science knowledge has an impact on the daily lives of all Americans³

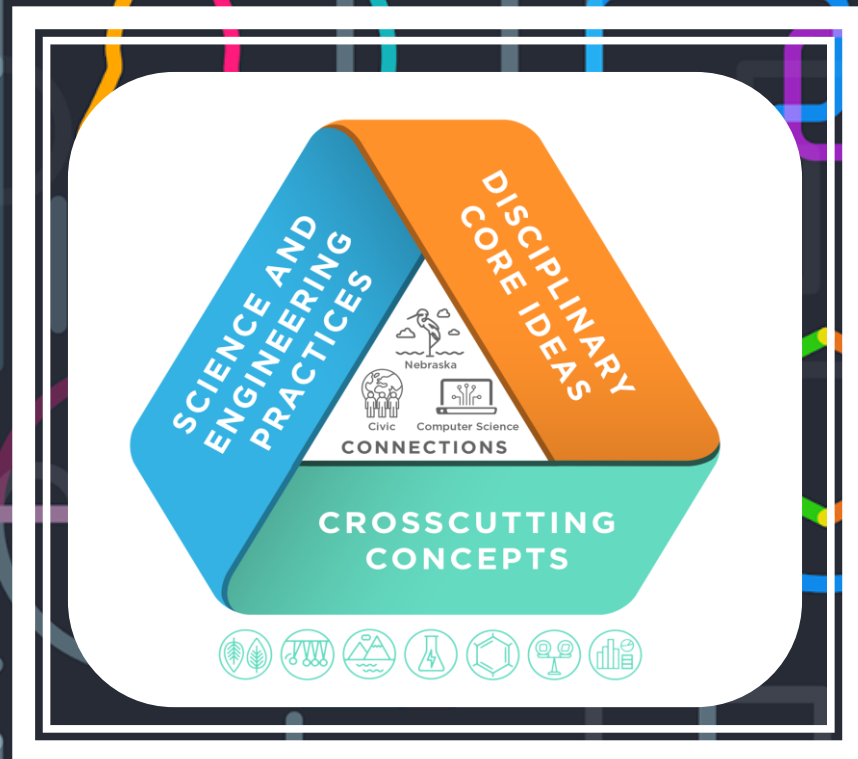


Science and technology helps us fight disease, protect the environment, and find new energy sources

Students are not prepared for the future⁴



In 2014 only about a third of high school students who took the ACT test were ready for college-level science



Nebraska's Science System Claims

Students can demonstrate the scientific literacy necessary to be civic minded decision makers and demonstrate readiness for college, career, and lifelong learning through application of science and engineering practices and crosscutting concepts within and among the disciplines of science.

Critical Consumers of Information

Students can gather, analyze, and communicate information from multiple sources to use as evidence to make sense of familiar and unfamiliar phenomena and problems.

Interconnectedness of Science

Students can make connections between disciplinary core ideas within the physical science, life science, and Earth and Space sciences domains, across multiple science domains, and across multiple content areas (such as mathematics and English language arts) to make sense of familiar and unfamiliar phenomena and problems.

OBSERVING, POSING QUESTIONS,
MAKING SENSE OF REAL-WORLD
OBJECTS AND EVENTS (PHENOMENA)



IN PHYSICS CLASS, JENNY CAN'T WAIT TO INVESTIGATE WHAT MAKES HER HAIR STAND ON END.

DESIGNING SOLUTIONS USING
ENGINEERING AND TECHNOLOGY

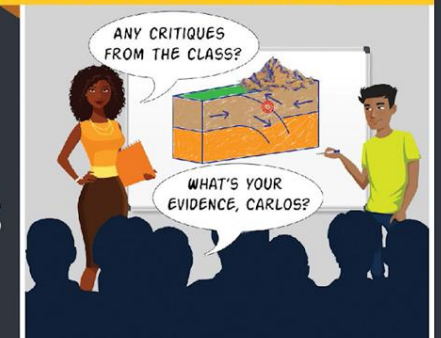


AFTER MANY DESIGN CHANGES, DEJA BUILT THE STRONGEST BRIDGE IN THE CLASS.

How today's students learn SCIENCE



DEVELOPING MODELS TO EXPLAIN
REAL-WORLD OBJECTS OR EVENTS



MEANWHILE, IN MS. STURGEON'S EARTH SCIENCE CLASS, CARLOS EXPLAINS HOW SOME MOUNTAINS FORM.

PLANNING AND CARRYING OUT
INVESTIGATIONS AND ANALYZING DATA



STUDENTS INVESTIGATE THE QUALITY OF WATER IN A NEARBY POND.

DISCUSSING, EXPLAINING, AND USING EVIDENCE FOR IDEAS



IN THE GYM, BOBBY DEMONSTRATES AND EXPLAINS HIS IDEAS ABOUT ENERGY TRANSFER.

https://ngss.nsta.org/Documents/ngss_infographic_2_v2.pdf

A Teacher's Journey to Transition from SCIENTIFIC INQUIRY to 3D TEACHING AND LEARNING

Shift #1: 3-D Teaching and Learning

Instruction should allow students to...

Apply science content knowledge through three-dimensional learning.

Shift #2: Integrated Science

Instruction should allow students to...

Connect ideas across science domains by explaining natural phenomena and designing solutions to real-world challenges.

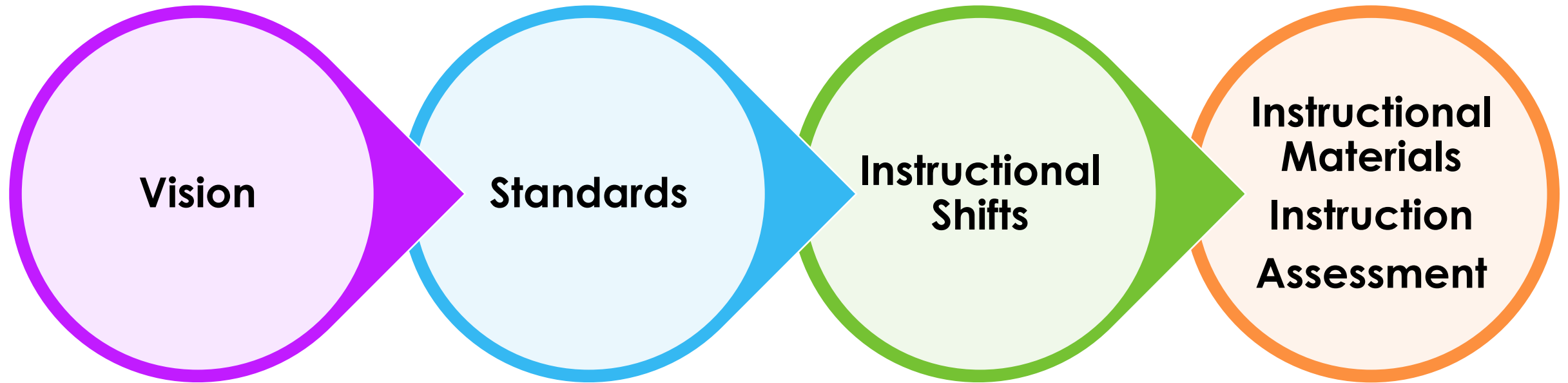
Shift #3: Interdisciplinary Teaching and Learning

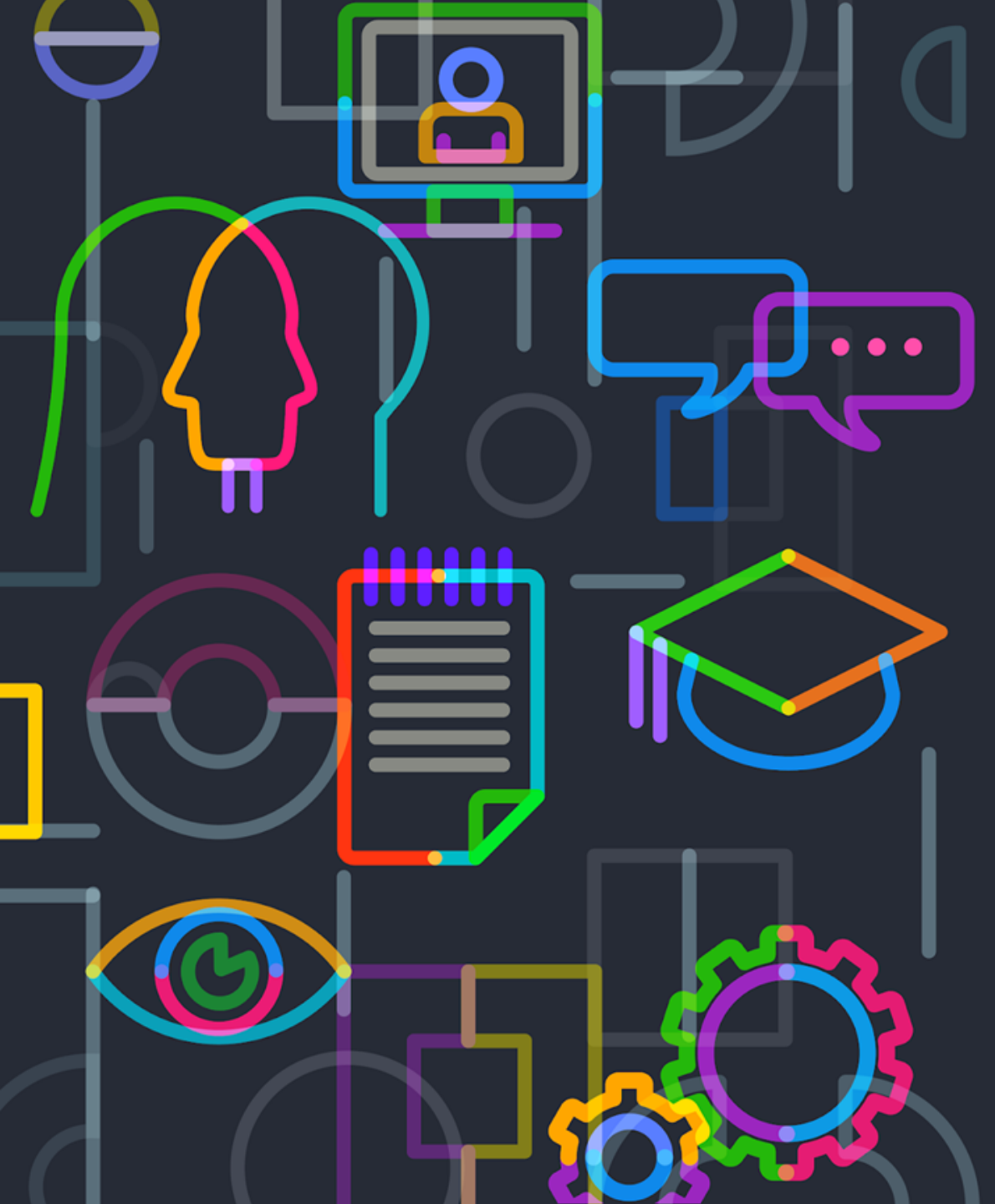
Instruction should allow students to...

Use overlapping skills to investigate, evaluate, and reason scientifically across disciplines.



How will Nebraska's Vision be Achieved for *All* Students?



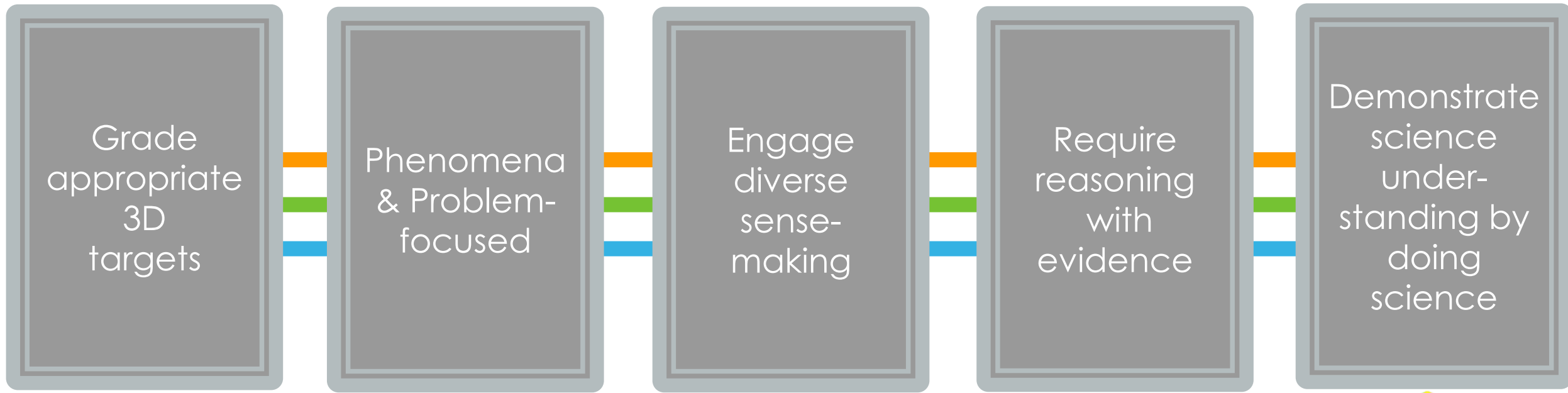


“We have a responsibility to ensure that all students have equitable access to the education necessary to achieve their full potential.

A key aspect of this is that all students receive strong, standards-aligned instruction.”

~Cory Epler, Chief Academic Officer
NE Department of Education

5 Features for a Coherent Science System



Evaluative Criteria Comparison

Instructional Materials

Evaluated based on:

- **Three-Dimensional** Learning
- **Phenomena and Problems** Drive Learning
- Coherence and Full Scope of the **Three Dimensions**
- Design to Facilitate Teacher Learning
- Instructional Supports and Usability

Assessments

Evaluated based on 4 Criteria:

1. Tasks are driven by high-quality scenarios that focus on **phenomena or problems**.
2. Tasks require **sense-making** using the **three dimensions**.
3. Tasks are fair and **equitable**.
4. Tasks support their intended **targets** and purpose.

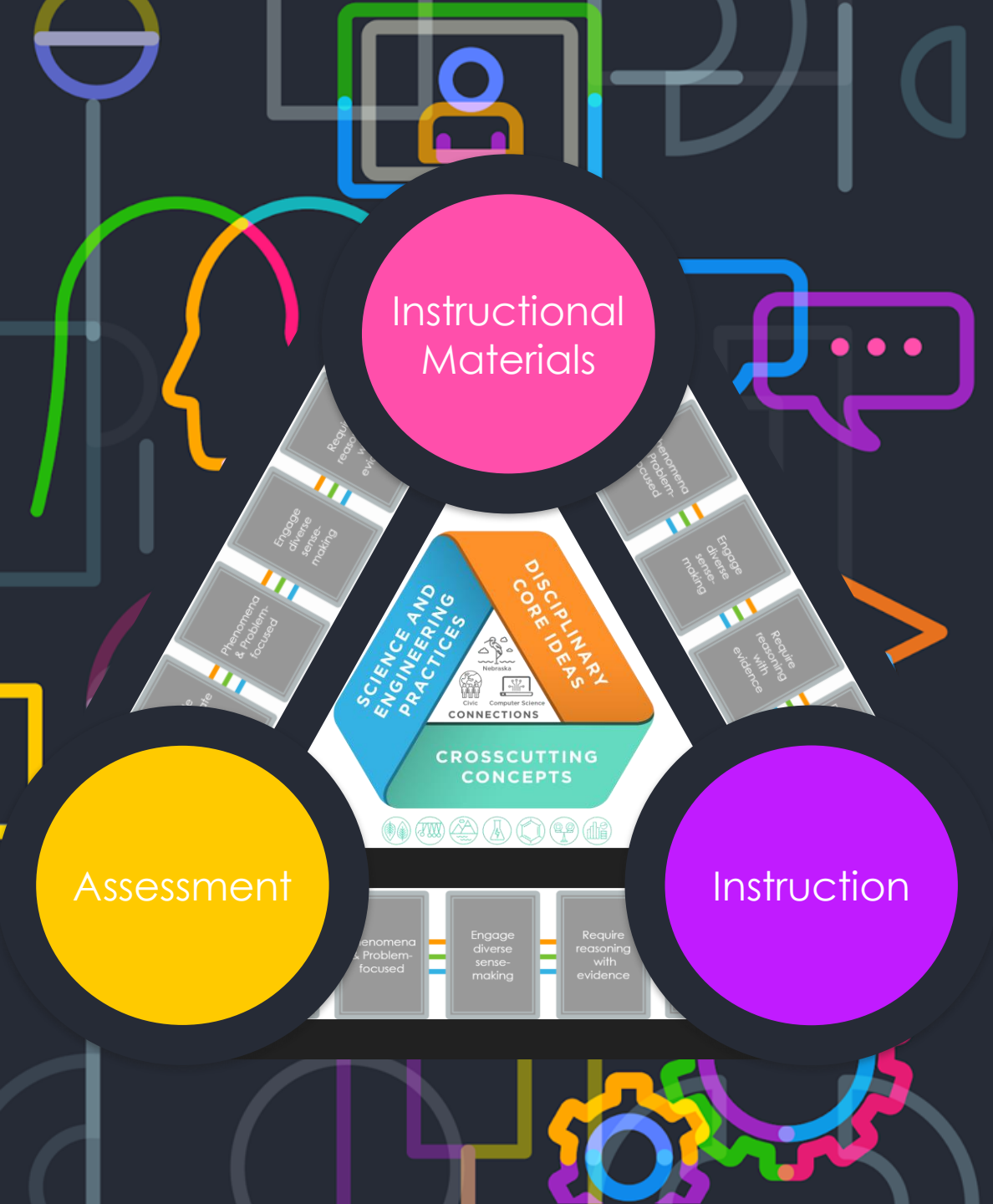
Classroom Culture that Supports

Evaluated based on:

- **All students** are engaged in the classroom activities
- Students see themselves, one another and the teacher as the “knowers” in the classroom

Equitable Sense-Making

- Students and the teacher value the **diverse resources** one another bring to the social endeavor of science.
- Instruction is organized around **phenomena and design challenges** to surface student ideas & questions to drive future instruction.



“If we want to ensure that all students--no matter their zip code, family income or background--get what they need to be successful, we must take a far more thoughtful approach to curriculum: the actual content kids learn in school.”

~EdReports

How will Nebraska's Vision be Achieved for *All* Students?

High-Quality
Instructional
Materials

Science in All
grades for All
students

Safe Spaces
to Fail
Forward

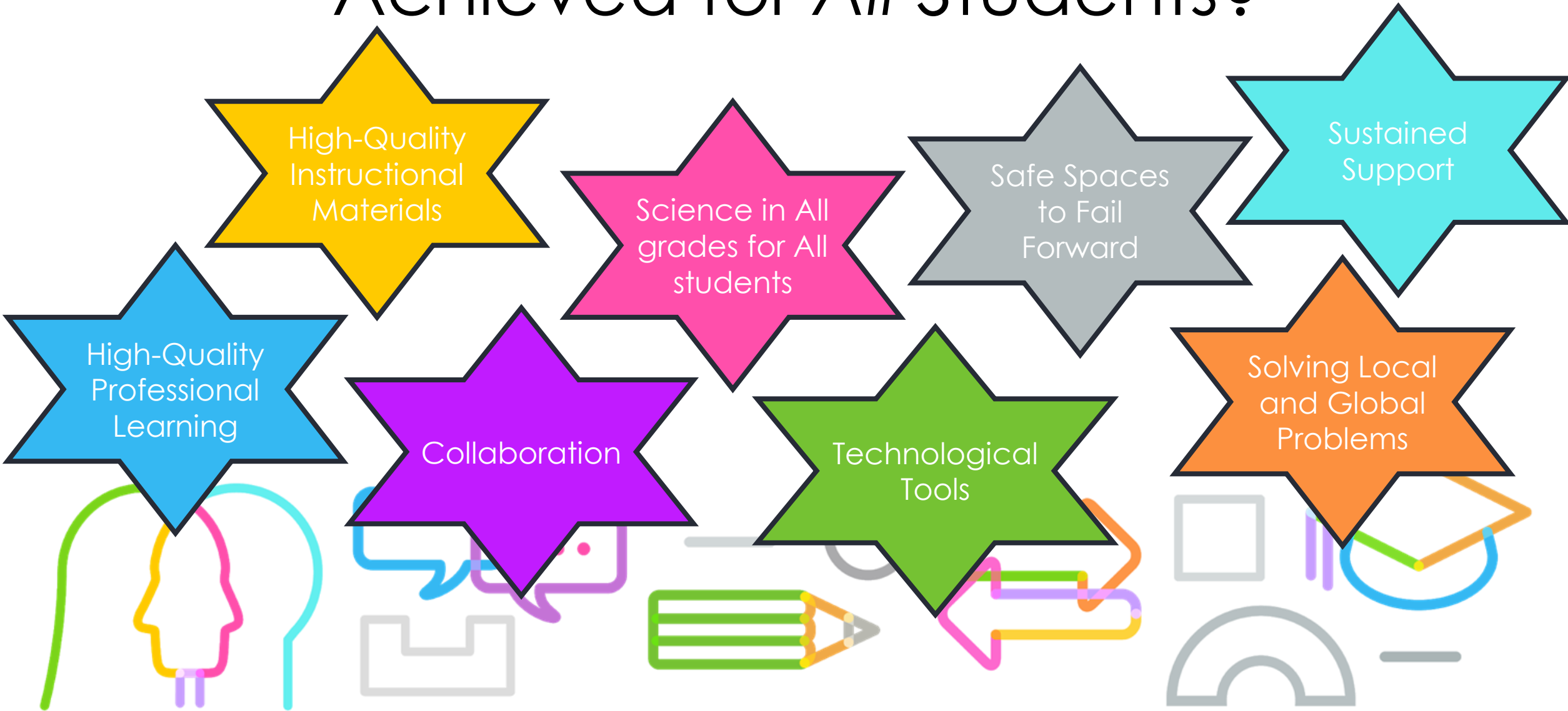
Sustained
Support

High-Quality
Professional
Learning

Collaboration

Technological
Tools

Solving Local
and Global
Problems






High-Quality Instructional Materials

“For education to be truly excellent and equitable, high quality curriculum and instructional materials must be available and implemented for all students.”

~EdReports


The background is a dark blue-grey color, densely populated with various colorful geometric shapes and icons. These include circles, triangles, squares, and lines in shades of yellow, green, blue, purple, and orange. Some icons are more complex, resembling a speech bubble, a magnifying glass, and a gear. The overall effect is a vibrant, abstract pattern that frames the central text.

High-Quality
Instructional
Materials

High-Quality
Professional
Learning

“Implementing a new curriculum — and knowing when and how to adjust or make modifications to address specific student needs — requires professional learning that enables teachers to actually experience, understand, and practice with the new materials.”

~Learning Forward



High-Quality
Instructional
Materials

Sustained
Support

High-Quality
Professional
Learning

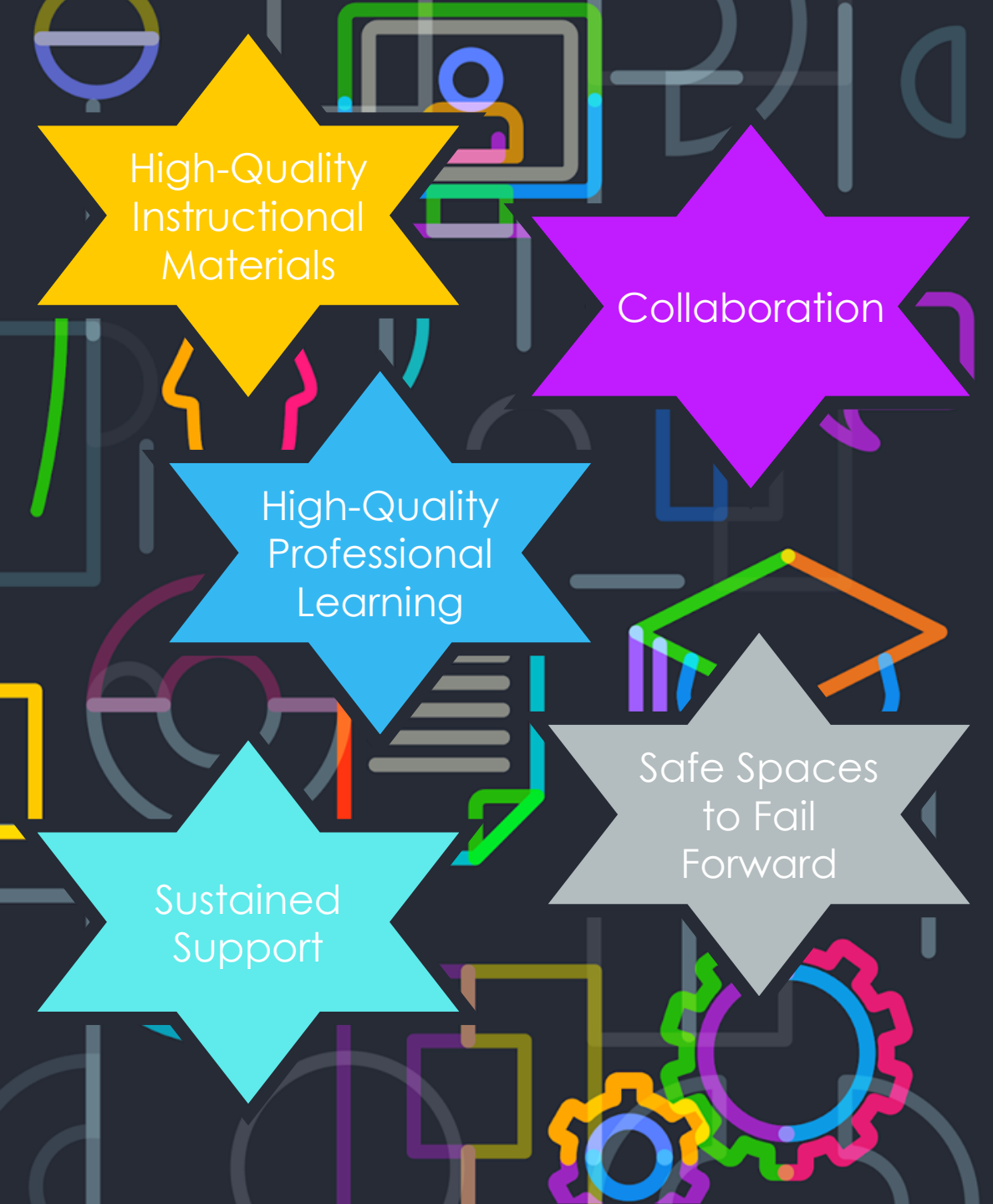
“When teachers invest ongoing, dedicated time to studying instructional materials, they set the foundation for transferring their learning into powerful lessons that can be differentiated and personalized to address individual student success.”

~Learning Forward



“intentionally creating instructional infrastructures that give teachers multiple, robust opportunities to learn from more informed peers, such as teacher leaders, can change both teacher mindsets and practices”

~Spillane, Hopkins, & Sweet



“Creating space for risk begins at the top of any school system. Principals must have space for risk, so that teachers have space for risk, so that students have space for risk. Permission to take chances is essential to an environment that allows growth.”

~Michael Thorton & Cheryl Harris,
Edutopia





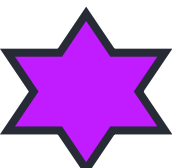
“When students who started the year behind grade level had access to stronger instruction...they closed gaps with their peers by six months; in classrooms with more grade-appropriate assignments, those gaps closed by more than seven months.”

~The Opportunity Myth



Administrator Support is Vital for Success

Take Action

-  Implement a process for the selection and adoption of high-quality instructional materials
-  Provide high quality professional learning using adopted instructional materials
-  Monitor implementation to identify areas that need additional support
-  Develop infrastructures that support teacher collaboration



Administrator Support is Vital for Success

Take Action

- ★ Consider tradeoffs and be willing to take appropriate risks
- ★ Develop schedules that provide equitable instructional time for science
- ★ Ensure that quality technology, equipment, and facilities are provided
- ★ Build partnerships with the school community's shareholders, while advocating for quality science education



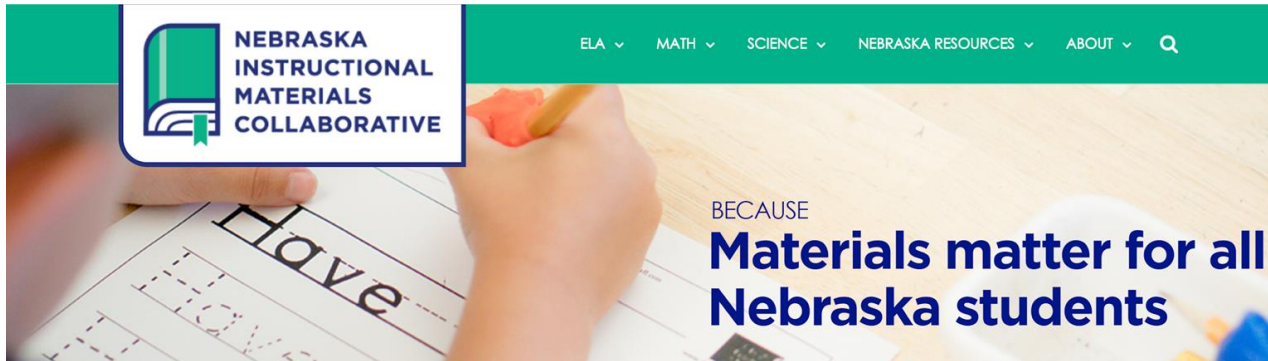
Administrator Support is Vital for Success

Take Action

- ★ Implement the use of curriculum-specific observation tools that include criteria for classroom culture
- ★ Learn more to support successful implementation of Nebraska's Vision for Science Education~*for all students*

Resources to Explore More

Nebraska Instructional Materials Collaborative



instructional materials reviews, review process tools & information, & content-specific resources

EdReports



reviews, research, rubrics & evidence, review process, publisher responses, educator review team information

Resources to Explore More

Learning Forward



professional learning
standards, research, and
resources

High Quality Curricula and Team-Based Professional Learning



This report explores the premise that there's nothing more powerful than great teachers skillfully using great instructional materials to motivate and engage students in their learning. Three real-world examples illustrate how schools and school systems are working to support teachers to skillfully use high-quality, standards-aligned curricula, by providing teachers with the time and expertise to use those curricula well, with a focus on team-based, collaborative learning. The report also provides lessons learned across these sites and action steps to get schools and districts started on the journey.

Resources to Explore More

OpenSciEd



OpenSciEd will improve the supply of and demand for high-quality K-12 science instructional materials by producing free courses designed for new college and career-ready science standards



OpenSciEd is creating a set of exemplary, research-based science instructional materials that are designed for 3D science standards, and are freely available. 6-8th grade units will be available Aug. 15, 2019

4 Features of Classroom Culture

Features of Classroom Culture that Support Equitable Sensemaking 

Feature	Description	Observations
1. Who is engaged in (or excluded from) classroom activity? All students are engaged in the classroom activities.	<ul style="list-style-type: none">Equity means we focus on all students having opportunities to learn.Equity means we ensure the participation of students from historically marginalized groups. Participation can include speaking, but also include nodding, hand signals, body language and other physical expressions of engagement.	
2. Who is treated as a "knower" in the classroom? Students see themselves, one another and the teacher as the "knowers" in the classroom.	<ul style="list-style-type: none">The teacher is not the sole holder of knowledge in the classroom. Students lend valuable ideas to the discussion.The class respects all participants (students and teacher) and their ideas are seen as valuable, important, and helpful.Student sensemaking is not straightforward and may not seem logical to others, but is logical, rich and meaningful to the student.	
3. What ways of knowing are privileged in the classroom? Students and the teacher value the diverse resources one another bring to the social endeavor of science.	<ul style="list-style-type: none">Learning is meaningful when home and school worlds connect.All students bring valuable life experiences that are relevant to classroom learning, including their everyday language.Encourage and value students use of resources to make sense of phenomena including non-academic language, gesturing, metaphors, storytelling and other modes of expression.	
4. What science is practiced in the classroom? Instruction is organized around phenomena and design challenges to surface student ideas and question to drive future instruction.	<ul style="list-style-type: none">Science is not framed as the memorization of facts and definitions.Science is about making sense of the world around us including phenomena and design challenges.Student ideas and questions are surfaced and used to guide future investigations and inquiries.Students can tell you how what they're doing today is helping them explain a phenomenon or solve a problem.	

Adapted from Wingert, K. Classroom Culture Investigations. Presentation at CCSO Science SEAS, Los Angeles, CA. 20 Feb 2019

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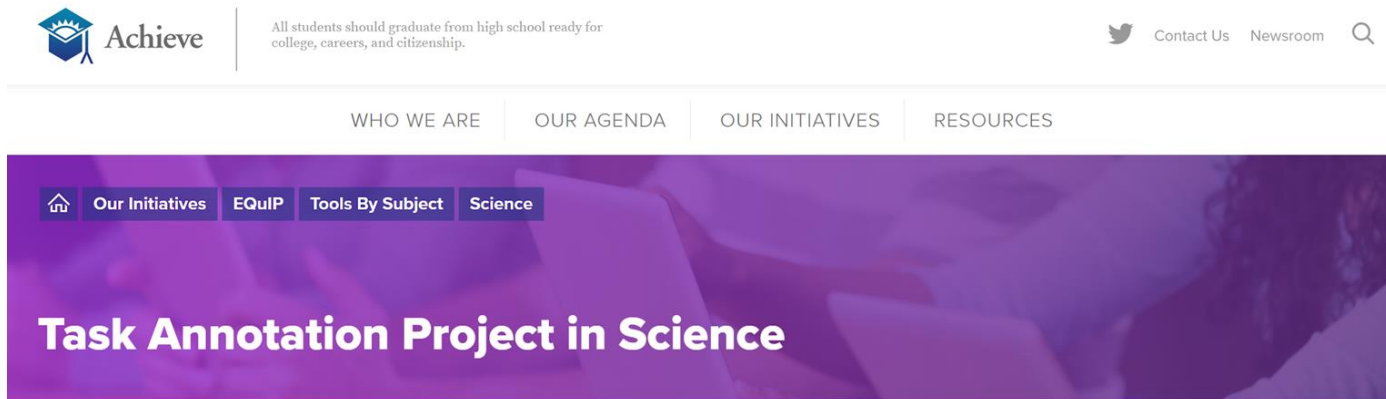
June 2019

Page 1

Classroom observation rubric and planning document designed to support equitable learning

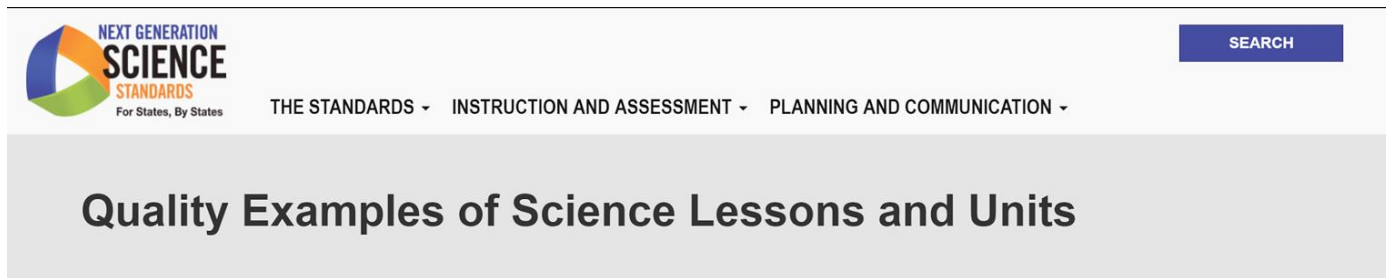
Resources to Explore More

Task Annotation Project in Science



3-D Assessment evaluative criteria, samples, annotated samples, tools and resources

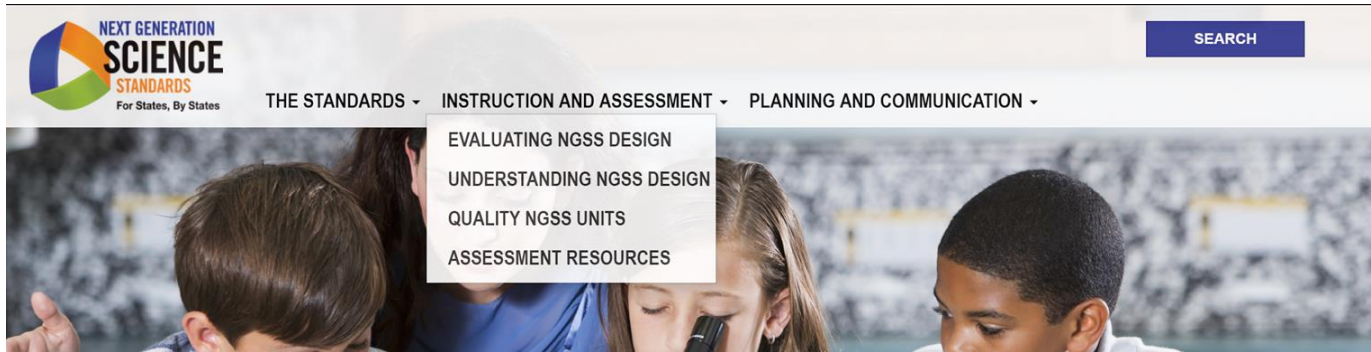
High Quality Instructional Units



High-quality instructional units vetted with the EQulP rubric

Resources to Explore More

NextGenScience



resources for standards, instructional materials, communication, and assessment

STEM Teaching Tools



research practice briefs, and professional learning modules for classroom assessment-- check out Practice Brief 21

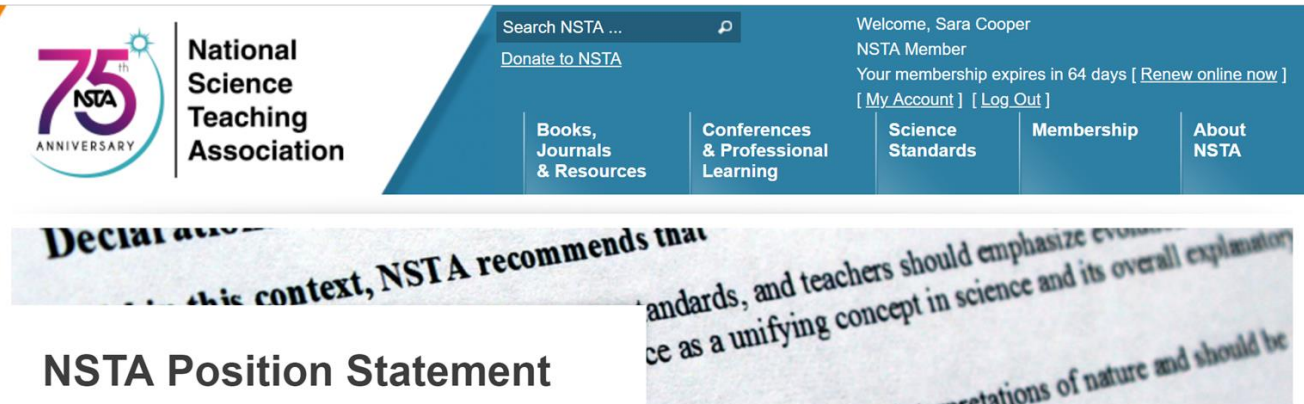


Practice Brief 21

What school building administrators should know about the new vision for K-12 science education

Resources to Explore More

NSTA Position Statement



The National Science Teaching Association's position statement for science that highlights key responsibilities for administrators. Additional resources available at <https://www.nsta.org/>

The Opportunity Myth



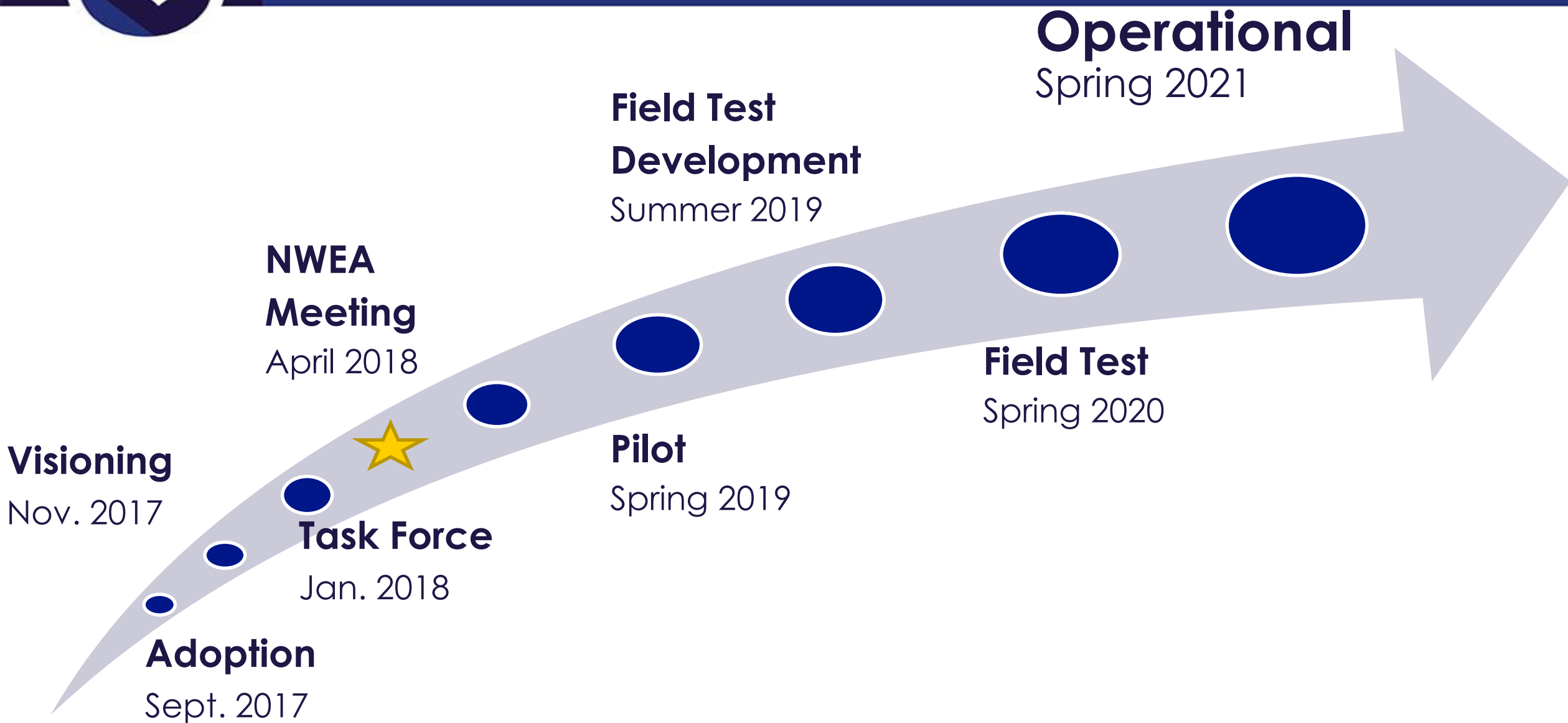
Research report exploring the question, “How can so many students be graduating from high school unprepared to meet their goals for college and careers?”, resources and tools for closing the achievement gap



NSCAS Summative Science

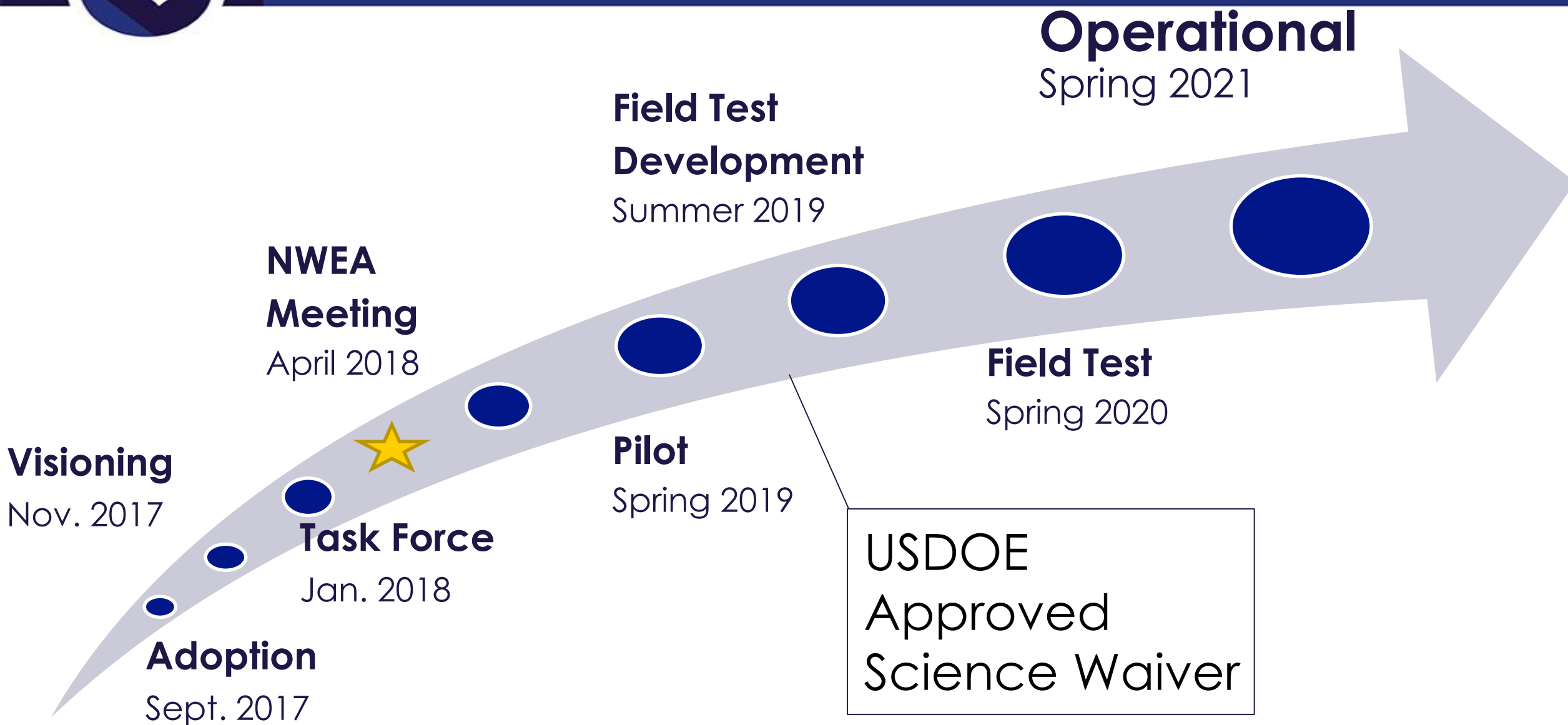


Development Timeline





Development Timeline



What does the waiver mean for statewide science assessments in 2019-2020?

Field tests are used to inform the process as we move towards an operational test in 2020-2021

- 5th and 8th grade students will only take **one science test in the spring of 2020**
 - a ***required field test*** aligned to Nebraska's College and Career Ready Standards for Science (NCCRS-S)
- Districts will **not receive results** from the field tests
 - “test” the assessment questions/prompts *not* “test” students
- **2020 results will not be reported to the public** on the Nebraska Education Profile (NEP)
- **2020 results will not be used in AQuESTT calculations**



NSCAS General Science Pilot

NSCAS Science Pilot: General Information

- Approximately 10,000 student participants
- Each test was made up of two tasks and associated prompts and student feedback questions for each task
- 15 students took part in cognitive labs
- Utilized Qualtrics platform for administration



NSCAS Science Pilot: Constructed Response

- Pilot test included a few constructed response prompts
 - Asked students to write a response using evidence from the task
 - The NCCRS-S lend themselves to these type of prompts
 - NWEA's software is not currently ready for these types of prompts
 - Will not be on the spring 2020 field test
- Currently, NDE is intending to include these type of prompts on the spring 2021 assessment as field test/operational items
 - Inclusion is not guaranteed as much work needs to be completed to make this happen
 - Lack of resources may interfere
 - Length of the test is a consideration
- Working on professional learning that would support this type of prompt



NSCAS Science Pilot: Takeaways

- Gained information on item types, word choice, and directions that influenced summer test development.
- Obtained insight into student engagement and perception of difficulty.
- Overall, the traditional item statistics indicated our approach can work.
- Learned important lessons about accommodations.



NSCAS Science Pilot: Next Steps

- Working on email with additional information from the pilot
 - Annotated tasks
 - More detailed lessons
 - Data
- <https://www.education.ne.gov/assessment/nscas-science-assessment-transition/>
- Pre-Pilot tasks are still available





NSCAS General Science

What we know as of July 2019.

Field Test

Purpose and Use

Participation

- **Testing the test, not students**
 - Districts will receive no information from the test about individual students
 - After administration, NDE and NWEA will review the information to see what lessons can be shared with districts
- **Census field test, expectation that all students in grades 5 & 8 participate**
 - Maybe exclusion of certain populations if accommodations are not ready
- **Field test will occur in the regular NSCAS test window**

Field Test

Test Design

Basics

- Task-based and focused on a phenomenon/problem
 - multiple prompts, typically 6-8 per task
 - All prompts are at least 2-dimensional
 - No standalone or 1-dimensional prompts
- Reflects the proportion of 3-dimensional elements (SEP, DCI, & CCC) in the NCCRS-S
- Allows for any combination of 3-dimensional elements in tasks and prompts
- Working on graphs that reflect this information

Field Test

Test Design

Length

- Number of tasks: About 6 per form
 - 4-5 operational tasks
 - 1-2 field test tasks
- Number of prompts: About 42 per form
 - 36 operational prompts, range of ± 2 prompts
- Time to administer: The average students should complete in about 75 minutes
 - Estimates based on pilot information
 - Expect large variability
 - NDE will communicate additional information with NSCAS Scheduling Guidelines

*****These are estimates*****

Field Test

Test Design

Constructed
Response

- **Will not be on the spring 2020 field test**
 - NWEA's software is not currently ready for these types of prompts
- **Currently, NDE is intending to include these type of prompts on the spring 2021 assessment as field test/operational items**
 - Inclusion is not guaranteed as much work needs to be completed to make this happen
 - Lack of resources may interfere
 - Length of the test is a consideration
- **Working on professional learning that would support this type of prompt**



Field Test

Practice Tasks

- **Item Type Sampler will be updated online**
 - Mid December
 - Based on Spring 2019 Pilot Test, but updated
 - Each grade will have 2 practice tasks
 - Approximately 5 prompts per task



Field Test

Text-to-Speech

Basics

- **Enabled for all students**
 - Does not mean that all students need it or should use it
 - It may not help all students, adults should help students determine if it will assist or interfere prior to testing
 - Students will need headphones to use this tool
- **Text-to-speech is a tool**
 - Students need to learn how to use tools
 - Everyone needs to manage expectations
 - Comparable to spell or grammar check
 - Working to continuously improve the functionality

Field Test

Text-to-Speech

Rationale

- **Text-to-speech vs. human readers**
 - Improved standardization and fairness
 - Reduces the opportunity for unintended interference from adults
 - Reduces the chance that a student may be cued to the right or wrong answer
 - Reduces the chance that an adult unintentionally commits a security breach during administration
 - Better matches the assistance that students will have access to after they complete school



NSCAS Alternate Science

What we know as of July 2019.

NSCAS Alternate: Field Test Basics

- **Testing the test, not students**

- Districts will receive no information from the test about individual students
- After administration, NDE and DRC will review the information to see what lessons can be shared with districts

- **Census field test, expectation that all students in grades 5 & 8 participate**

- **Field test will occur in the regular test window**



NSCAS Alternate: Field Test Design

- **Retain the familiar format**
 - Administered 1-to-1
 - Read aloud to student
 - All multiple choice with 3 answer options
 - All items are 1-dimensional
 - Most are standalone
 - Few items are intended to be administered back-to-back
- **Extended indicators**
 - Posted here: [Alternate Summative Assessment](#)
 - Include 3 access points
- **Working on graphs that reflect this information**



NSCAS Alternate: Field Test Practice

- **Updated Online Tool Training**

- Reflect the new Extended Science Indicators
- Reflect items intended to be administered back-to-back
- Ready in late October





Questions?

[Contact Us!](#)

Phone: 402-471-2495 Email: nde.stateassessment@nebraska.gov